User's Manual
V34 Fax-modem - AJ 2885P

P/N 8000 601 953
Revision 01

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Notice

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The only purpose of this manual is to provide information and installation instructions

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CXR has made every effort to provide the best possible quality in writing this manual but cannot be held responsible for any damage, which could result from errors or improper description of the equipment, its characteristics and operation.

Please read and enforce the safety instructions of the safety and installation chapters.

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Foreword

This document describes how to set up the *CXR AJ 2885 P modem*.

- **Chapter 1** is to familiarize the user with the operation of a modem.
- **Chapter 2** describes the installation.
- **Chapter 3** describes the most common uses of a modem.
- **Chapter 4** explains the operation of the modem security features and memories.
- **Chapter 5** provides technical characteristics.
- **Chapter 6** indicates how to solve operation problems.

Note to the reader

Users who are not familiar with the **AJ 2885 P** modem operation, should read the first three chapters. Advanced users can refer directly to **chapter 4** to use the advanced functions of the modem. Whenever a problem arises, please refer to **chapter 6**.

The CXR Anderson Jacobson team

thanks you for purchasing an ***AJ 2885*** modem**.** We hope this equipment will be to your satisfaction, and in order to provide you with a better service, we thank you for completing and mailing us the reply coupon enclosed with your modem. You can also find in our range of products some ISDN adapters. Please call you distributor or CXR for information.

Important Information

Conformity Statement EC

Manufacturer name: CXR

Manufacturer address: rue de l'Ornette - 28410 ABONDANT – France

Product name: AJ 2885 P

This equipment was design to comply with the ETSI – CTR.21 standard. It is intended to connect to the Public Switched Telephone Network. However, since differences exist between networks from a country to another or from an operator to another, this conformity does not constitute an absolute guaranty for an optimum operation of the equipment in any situation of use. In any case of problem, you should first contact your provider of this equipment.

The CE mark attests the conformity of this equipment to the main requirements of the R&TTE 1999/05/CEE European community :

For the user's safety, in compliance with the 73/23/EEC European Directive, as per EN.60950 standard

For electromagnetic compatibility, in compliance with the 89/336/EEC European Directive, as per EN.61000-6-1 and EN.61000-6-3 standards.

CXR states that this equipment is manufactured in compliance with the Annex II of the 1999/05/EEC European Directive.

Safety Instructions

The following accesses are referenced as SELV (Safety Low Voltage] in conformity with EN.60950 standards:

- 5 VDC Input of the AJ 2885P-xxV desktop unit
- 48 VDC Input of the AJ 2885 P - xxC desktop unit
- Terminal: V24 - RS232 data port

The following access are referenced as TNV (Telecommunication Network Voltage] in conformity with EN.60950 standards:

- Tel-Line : PSTN access as a TNV-3 interface,
- Lease : Leased line access as a TNV-2 interface.

Desktop AJ 2885 P - xxV:

The wall mount power supply adapter is the main switching element. Thus this plug must be installed close to the equipment and provided easy access.

To totally disconnect the equipment from the supply source we recommend you disconnect the power cord from the mains wall outlet. In order to comply with the safety regulations, it is imperative to use the accessories (power supply and cables) provided with the equipment. When access to the inside of the modem is necessary, it is imperative to disconnect the power adapter from the mains outlet.

Desktop AJ 2885 P – xx i :

The power cord is the main switching element. Thus the mains outlet must be installed close to the equipment and provided easy access. In order to comply with the safety regulations, it is imperative to use the accessories (power supply and cables) provided with the equipment. When access to the inside of the modem is necessary, it is imperative to disconnect the power cord from the mains outlet. This is a Class 2 product as shows the ⧈ symbol close to the mains socket; its earth connection is for functional purpose only.

Desktop AJ 2885 P – xxM :

The power cord is the main switching element. Thus the mains outlet must be installed close to the equipment and provided easy access. In order to comply with the safety regulations, it is imperative to use the accessories (power supply and cables) provided with the equipment. When access to the inside of the modem is necessary, it is imperative to disconnect the power cord from the mains outlet. This is a Class 1 product; its earth connection must be carefully provided through its original mains cord.

Rack mountable card AJ 2885 P - xxR

The power switch located on the rear of the chassis is the only switching element, thus it must be fully accessible. The connection to the mains is achieved through the cable equipped with a male-grounded plug. Extract the card from the chassis when maintenance or servicing is required

For safety reasons, any operation on the equipment and particularly opening the desktop enclosure must be carried out by maintenance person qualified by CXR.

The equipment must imperatively be returned to CXR in any case of anomaly, fall, loss of performance, water exposure, power supply damage, power or line cord damage, …

Environment

The AJ 2885 P is designed for residential or light industrial use within the following environmental conditions:

- Storage Temperature 0 to 70 °C
- Operating Temperature: 0 to 45 °C
- Hygrometry: 0 to 90% without condensation
- Class: IP40
- Flammability: UL94-V0

Place the equipment in a area well suited for its good operation and its

- Equipment must not be exposed to excessive solar radiation
- Equipment must not be in contact with water. It must not be used near a water reserve or in a wet location.
- Equipment must be installed on a plane and horizontal surface, without vibration.
- Make sure the area is clean, dry and exempt of dust
- Make sure that nothing could obstruct the air vent of the product, and that no small size part (screw, staple, clip, …) could get into it.
- Always disconnect the mains connection before any operation (move, connecting other equipment, …) on the equipment. The mains cord must be taken from the socket; any effort on the cord could induce damages and risk of electrical shock.

Use

The AJ 2885 modem is intended to connect to the Public Switch Telephone Network and to a leased line in voice frequency mode (300 to 3400 Hz) It was designed to comply with the ETSI CTR.21 standard.

The AJ 2885 P modem provides the modes of connection as per the following ITU-T standards:

- Data modes : V34, V32Bis, V32, V22Bis, V22, V23, V21
- Error correction and data compression : V42, V42Bis, MNP4, MNP5
- Fax mode : Group 3, Class-2, V17, V29, V27Ter, V21

The AJ2885P connects to a data terminal equipment through its terminal interface :

- V24-V28 or RS232
- V11 compatible with X21 and V35 though configuration jumpers (except FT model)
- Data rates : 300 to 115,200 BPS in asynchronous mode, and 1200 to 33,600 BPS in synchronous mode.

Correct Disposal of the Product - Recycling

In compliance with the European rules for separate collection systems and Waste of Electric and Electronic Equipment, this marking shown on this product indicates that it should not be disposed with other household wastes at the end of working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes an d recycle it responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer were they purchased this product, or their local government office for details of where and how they can take this item for environmental safe recycling.

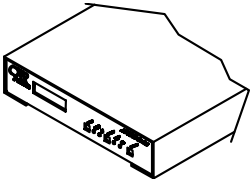
Business users should contact their supplier and check the term and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.

Product range

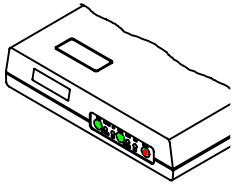
The ***AJ 2885*** modem has various options:

- Dial-up
- Leased line
- Group III fax
- Stand alone or rack
- LCD front panel

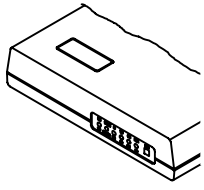
These different versions are summed up in the following table. The names in the first column will be used throughout the manual to indicate when these options apply.



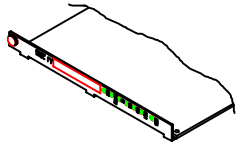
Metallic enclosure.



LCD version



Stand alone version



Rackmount version

Versions : **Options :**	**FT**	**FPx**	**SD/SM**	**BPx**	**BDx**
2 / 4 wire leased line		●	●	●	●
Dial backup and real time clock		●	●	●	●
14.4 KBPS – Cl.2 G.3 Fax	●	●			
V11 – X21 / V35 interface		●	●	●	●
V23 / Bell 202 T 1200/1200 4 wire mode				●	●
LCD and 3 keys front panel			●		●
remote action and alarm relays			●		●
Firmware in Flash memory	●	●	●	●	●
Metallic enclosure & internal 110/230 V Mains	-	-	SDM	BPM	BDM
Plastic enclosure & internal 110/230 V Mains	-	-	SDI	-	-
Metallic enclosure & internal 48 Vdc converter (*)	-	-	SDN	BPN	BDN
Plastic enclosure and wall mount 110/230 mains supply	FTV	FPV	-	-	-
Plastic enclosure and internal 48Vdc converter (*)	-	FPC	-	-	-
Card for the AMS4/16 chassis	-	FPR	-	BPR	-

Options :

- Tropicalization : Special treatment that allows the modem to be used in strong climatic environment.
- Internal DC converter (*) : the AJ2885P modem can also be provided with a CD converter for supply voltages of 12, 24 and 36 Vdc.

AJ 2885 features

The ***AJ 2885*** is a modem for the professional user. It encompasses a number of features that place it above the rest. It includes features such as:

- Configuration through front panel LCD and key pad: for synchronous application, the 2885 SDV can be fully set up from its user friendly front panel.
- Busy-Out: Whenever modems are pooled, a faulty modem will lock-up the rest. The busy-out, standard in the CXR modems lets the PBX pass onto the next modem without upsetting the system.
- Line Quality Testing: The modem can test a line at every call. If it finds it below standard, it will hang-up and retry up to 5 times transparently to the user. This guarantees that you have the most reliable connection every time on any type of infrastructure.
- BERT: The modem can perform simple Bit Error Rate Tests between two CXR modems to qualify the digital transmission of data.
- ITU V.13: Half duplex operation.
- 10 Configurations
- Unattended Automatic Dial Backup: If ever your Leased Line fails, the ***AJ 2885*** will back-up onto the dial-up network. Not only that, it will continue to monitor the Leased Line until it is operational and switch back automatically. This is called Intelligent Look-Back. Back-up may be allowed and disabled over week-day and week-end periods.
- Password Security: To change configuration of the modem, 2 levels of password security are provided - User & Supervisor.
- Connection Security: 4 levels of security are provided:
    - Answerback, i.e. where the far modem asks the calling modem for a password, transparently to the user.
    - Pass Through Access, i.e. where the far modem asks the user for a password.
    - Automatic Modem Password Access, i.e. same as before but for synchronous operation.
    - Call back, i.e. the far modem asks for a password from the calling modem and hangs up. The far modem associates a telephone number with the password and calls back the original calling modem.
- 5 different Statuses:
    - Modem Configuration.
    - Line, e.g. Xmit/Rcve levels, signal quality etc.
    - Line Error Statistics, e.g. for MNP or V42, the number of bad characters, bytes frames etc.
    - Leased Line Statistics, e.g. connection & idle time etc.
    - Dial-Up Statistics, e.g. same as leased line with directory information etc.

This is but a short list. For full details, consult the Command Set Manual.

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1. Introduction

This chapter is to familiarize the user with the operation of a modem. Note: <CR> indicates that the user must press the return key after a command sequence.

1.1. The modem

A modem is a device that allows two terminals (DTE, PC...) to communicate via a telecommunication line (phone line).

The data is converted by the modem into electrical signals adapted to the telecommunication network. This conversion is called modulation and demodulation.

Various conversion techniques have been developed to speed-up the data flow. The different speeds are particular to each type of modulation: 300 bps in V21, 2400 bps in V22bis, 14400 bps in V32bis, and 33600 bps in V34.

1.2. The modem-fax

A fax device transmits scanned images via the telephone network.

In addition to traditional fax machines, the fax modem also allows transfer of computer data such as:

- ASCII files from a text processor,
- PCX or TIF files from a graphic editor, etc.

The Fax mode operation is controlled by a fax software which:

- Converts files to T4 format (fax graphic format),
- Transmits and receives faxes,
- Supervises fax modem operation.

Supervision of the fax modem is carried out by a standard protocol: "Asynchronous Facsimile DCE Control Standard", Class 1 Service - TR 29.2188 or Class 2 Service - TR 29.2388.

The computer equipped with a fax modem will be able to transmit and receive fax in Group III mode:

- At about one A4 page per minute,
- In fine or standard resolution.

See chapter 5 for the list of modem class 1 and 2 commands.

1.3. Calling modes - dialing

The modem can be in 2 modes:

- Send or calling,
- Receive or answer.

1.3.1. Calling Mode

The modem switches to originate mode when the dial command: **ATD 37487126** is sent (example number).

The calling modem then waits for the remote modem to respond.

1.3.2. Answering Mode

The modem switches to answer mode when it detects ringing on the phone line.

The answer is carried out automatically if the command **ATS0 = 2** was sent to the modem by the local PC. A training sequence is then initiated. A training sequence is the hand-shake sequence between modems to establish a communication link. It establishes speed, modes...

1.4. Leased line

A leased line is a permanent communication link dedicated between two modems. This kind of link is used for:

- High usage,
- Secure communications,
- Privately managed networks.

The leased line, can be a:

- 4-Wire type where there is:
  - 1 transmit pair,
  - 1 receive pair.
- 2-Wire type where:
  - the same pair of wires is used for transmit & receive.

For a leased line, a modem is designated:

- Originating modem (ORIGINATE or MASTER),
- The other as the answering modem (ANSWER or SLAVE).

Modems in leased line mode always try to connect when power is on, in order to provide permanent a link.

The **AJ 2885** modem can establish leased line connections in the following speeds:

V22	1200 bps
V22bis	2400 bps
V32	9600 bps/4800 bps
V32bis	14400 bps/12000 bps
V34	33600 bps down to 2400 per steps of 2400 bps

In case of failure on the leased line, the **AJ 2885** modem performs automatic switch-over to the dial-up PSTN. It then monitors continuously the leased line until it can connect again on leased line. The AJ2885P modem is provided with an internal real time clock and calendar, to disable dial backup when the link is not of use and then optimise the PSTN cost .

1.5. Protocols

Two types of protocols can be used to improve communication performance between two modems:

- Error correction:
  - MNP4 or V42 detect errors which occurred during data transmission, and either correct them or re-transmit the data.

- Data compression:
  - MNP5 or V42bis compress the data and thus transmit at a higher effective speed.

These two types of protocols improve efficiency and reliability of a connection.

1.6. Memory

Beyond these basic principles, the modem offers other functions, aimed at improving performance and ease of use.

These functions are controlled via the memory (S-Registers) of the modem, and are available via the extended AT command set.

These functions are described in chapter 4 of this manual.
Some of the extra functions are:

- Storage of phone numbers,
- Forced V24 signals,
- Exchange of a password between two modems ("Answer Back"),
- Pre-qualification of the telephone line,
- Storage of user modem configuration.

2. Installation

2.1. Stand alone version

Package Contents:

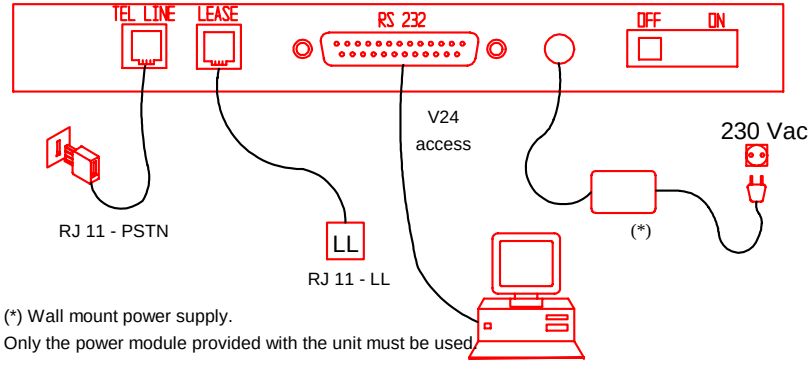
Before installing your modem, check all these items are present:

- One **AJ 2885** modem
- One RJ11 phone cable
- Power supply or 48V cable for SPC version
- Leased line RJ-11 cable, except for STV and FTV versions
- A CD-ROM that includes
  - The AT and V25bis command reference manual
  - This User manual
- Software (as an option)

Connections:

Connect your modem as shown on the following diagram:

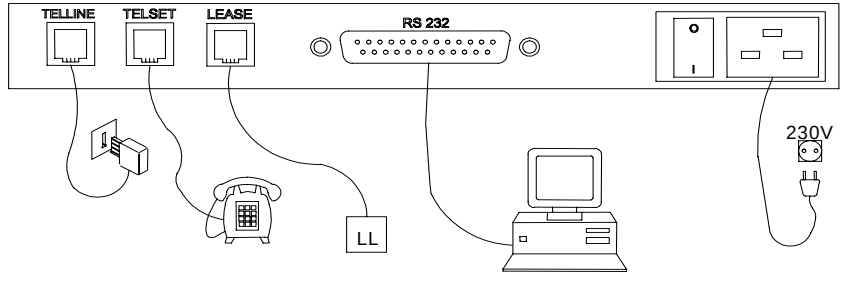
Classic stand alone enclosure:



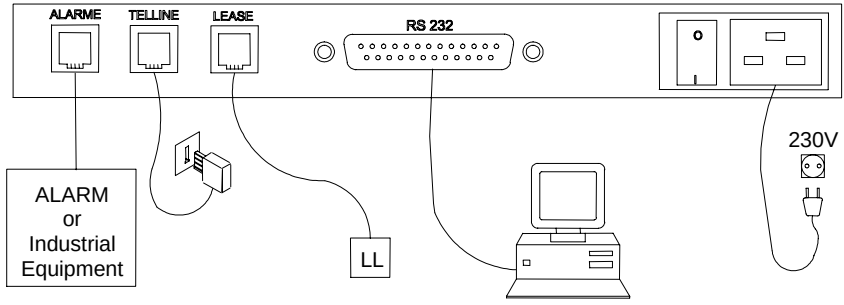
(*) Wall mount power supply.
Only the power module provided with the unit must be used.

Metallic enclosure: provides 3 RJ11 sockets:

- Standard SDM version:



- SDM version + alarm relay option:



Power On:

When the modem is connected, switch the power switch to the "On" position.

(*) Power supply DC adapter or Power supply cable.

2.2. Rackmount version

Package Contents:

Before installing your modem, check all these items are present:

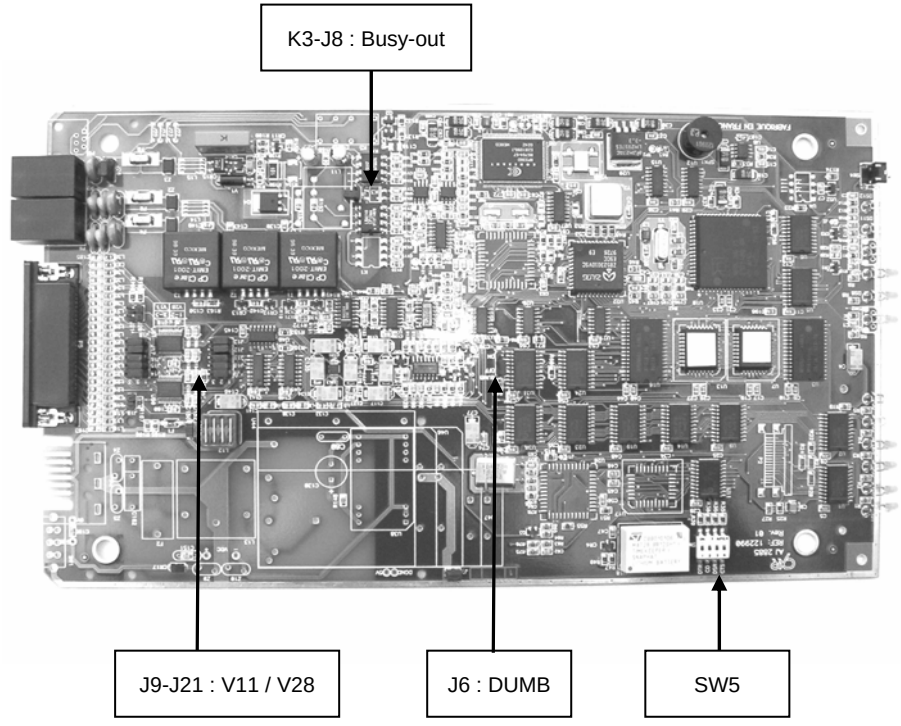
- One **AJ 2885** card
- One RJ11 phone cable (as an option)
- A leased line RJ-11 cable (as an option)
- A CD-ROM that includes
  - AT command set reference manual
  - User manual
- Software (as an option)

If you ordered the busy out function, check that the K3 option is available. This function forces the line to be active when there is:

- A faulty power supply,
- No answer to a call after N rings (N is set by the S20 register). This maybe due to a non-connected data terminal (DTR/108 absent).
- N successive ineffective connection sequences (N is set by the S20 register). This maybe due to a bad connection to the telephone line.

This option is particularly useful for line pooling applications, and in case of fault, incoming calls are switched to another modem in the pool.

Your AJ2885 board provides an interface to the AMS controller board that is an option to your AMS16 rack. Refer to the controller card manual for managing the AJ2885 modem through the controller card.



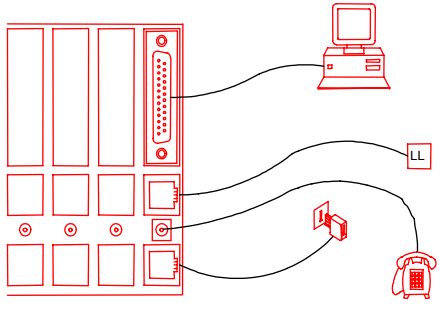
Sandwich

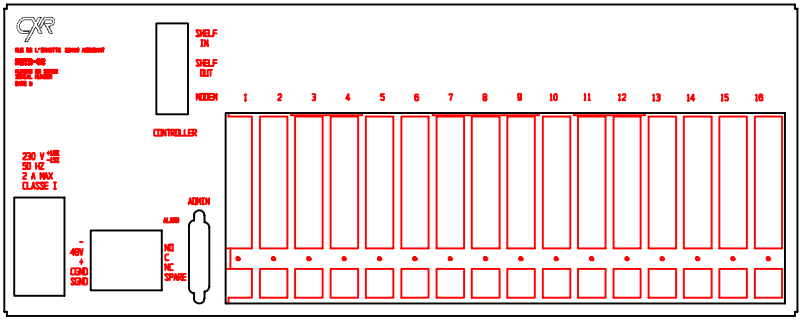
Installation:

See rack operation manual to install your modem.

Find an empty location in the rack and insert the **AJ 2885** card into its card guide.

Connection :
Connect your modem from the rear of the rack, according to the following diagram:





Power On:

Inserting the modem card connects it to the power supply of the rack. Power-on is carried out by the power switch located at the rear of the rack.

Make sure the front panel screws are well fixed onto the chassis so that the modem card is well connected to the AMS back plane.

2.3. Switch and Jumper settings

2.3.1. Dumb mode : J6 jumper

When set in the ON position, this jumper disables the AT and V25Bis commands. This may be interesting for synchronous connection, or to protect the configuration of the modem set for answer mode.

2.3.2. SW5 switch

This switch does not apply on the FT model.

The following data terminal signals can be forced ON through these four switches :

Switch	Signal	On position effect	AT Command
SW5-1	DTR	The 108 – DTR signal from the terminal is ignored	AT &D0
SW5-2	CD	The modem provides a permanent 109 – CD signal	AT &C0
SW5-3	DSR	The modem provides a permanent 107 - DSR signal	AT %D0
SW5-4	CTS	The modem provides a permanent 106 – CTS signal	AT %C0

2.3.3. V11 – V28 terminal interface : J9 – J21 jumpers

This switch does not apply on the FT model.

The J9-J21 jumpers set the data terminal interface for :

- V24-V28 or RS232 : jumpers in the 1–2 position
- V11 (X21 / V35) : jumpers in the 2–3 position

  In this case, jumpers J19, J20 and J21 connect a 560 Ohm impedance on the V11 receivers the the TD, XCLK and DTR signal respectively.

These jumpers are described in a dedicated appendix at the end of this manual.

2.4. Power-up self-test

When the modem is turned on, an automatic self-test is performed, which tests:

- Its program memory
- Its data memory
- Its stored memory
- Its data processing unit

The test lasts a few seconds and ends with a series of:

- Different tones if the test is ok,
- The same tone if a failure is detected. This failure is stored in the S19 register or detailed by the ATi7 command. See chapter 6 "Troubleshooting".

The self test result is displayed on the front panel LCD of the 2885 SDV version.

3. Operation

The modem operation is usually controlled through its terminal interface that connects to a computer or a terminal, and through a set of AT commands.

On the computer (a PC for example), start a communication software such as the Windows HyperTerminal (HyperTerminal and Windows are trade marks of their respective owners).

The AJ2885 modem adapts automatically to the speed (300 to 115,200 BPS) and format of characters sent by the computer when it receives the following characters :

AT or at

3.1. Syntax of AT commands

Commands are built as follows :

AT *xxxxxxx* <RC>

- **AT** is the command prefix
- ***xxxxxx*** is the actual command and parameter
- **<RC>** complete the command line. This character corresponds to the 'Carriage return' or 'Enter' key f the keyboard.

The following commands do not comply with this syntax :

- **A/ or a/** to repeat the last command
- **+++** to escape from connect data mode to local command mode
- **^Z^Z^Z** to escape from connect data mode to remote command mode

Modem sends back an answer when a command is competed :

- **OK** if the command is successfully completed
- **ERROR** in case of error in the command line
- **CONNECT** (or another message) in case of action command to place a call for example

The AT and V25Bis reference manual provides the detail of the commands.

3.2. First dialogue

You can then try the following commands :

AT<RC> (<RC> or ENTER)
Modem answer : *OK*

ATI3 <RC>
Answer: *AJ 2885P-FPVF Rev-5.10**
* example of product identification

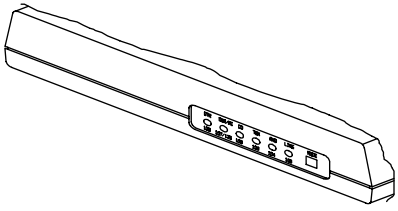
AT&S <RC>
Answer : modem sends multiple pages of configuration and status.

This first dialog being completed, the chapter 5 for configuration and the reference manual provide detailed description of the modem commands.

4. Front panel operation

4.1. Operating modes

This chapter describes the operation of the six LEDs front panel version of 2885 modem.



4.1.1. Operating modes

The modem can operate in one of the four following modes:

1. IDLE MODE:

- The modem enters the idle mode after powering up if it passes its power-up self test. Beeps announcing the end of the test can be heard unless the speaker is turned off (see corresponding command).
- From this mode, the modem will enter in command mode by receiving a command from the DTE, or in ONLINE mode if an automatic call is initiated from the front panel, or if a call is received when the modem is configured to answer calls.

2. COMMAND MODE:

- The modem enters the command mode when it receives a recognized command. In this mode, commands are interpreted and executed. (Configuration set up - automatic call request...). The modem also enters in command mode when it recognizes an escape sequence in the data when in an on-line rude.

3. ONLINE MODE:

- The on-line mode starts, when detecting a carrier signal from a remote modem or when dialing is successfully completed.

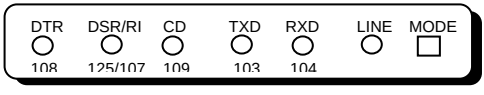
4. TEST:

- The test mode is selected when in a command mode using appropriate test commands.

4.1.2. The Front Panel

The front panel of the modem has six red LEDs and one push button.

The different LEDs indicate the state of the modem and the status of the self test sequence.



The following table list these functions:

LED	Circuit	Function
DTR (Data Terminal Ready)	108	Indicates that the data terminal equipment connected to the modem is ready for data communication. On if DTR is set or fllashing if DTR-108 is not set. Bad Eprom checksum during self test.
DSR/RI (Data Set Ready/Ring Indicator)	107/125	Flashes when an incoming ring is received (125/RI). Remains lighted permanently when connecting. On leased line, the Originate modem flashes 10 times per second and the Answer one 4 times per second, when waiting for carrier. Also bad RAM causes flashing of light during power up test.
CD (Carrier Detect)	109	Indicates that the remote modem's carrier signal has been received by the modem. In test mode, this light will flash if the test is negative. Also on if bad non volatile ram checksum during power up test.
TXD (Transmit Data)	103	Flashes as data is transmitted by the modem.
RXD (Receive Data)	104	Flashes as data is received by the modem.
LINE	-	Indicates the mode of connection: Permanent: Leased Line Flashing: PSTN or V23 half duplex Off: Command Mode Equally a sign of bad DSP during power up test. PSTN Off: 300 bps Flash 1 Time = 1200 bps Flash 2 Times = 2400 bps Flash 3 Times = 4800 bps Flash 4 Times = 9600 bps Flash 5 Times = 12000 bps Flash 6 Times = 14400 bps Flash 7 Times = 16800 bps Flash 8 Times = 19200 bps Flash 9 Times = 7200 bps Flash 12 Times = 21600 bps Flash 13 Times = 24000 bps Flash 14 Times = 26400 bps Flash 15 Times = 28800 bps Flash 16 Times = 31600 bps Lighted permanent = 33600 bps

4.1.3. The Push Button

The MODE push button programs different functions depending on the current mode.

IN COMMAND MODE:

- Performs automatic dialing of the number stored in memory or holds the line in originate mode if no number was stored, or starts answering if rings were detected on the line. The length of the press is signaled by a single flash of the DSR LED. The PSTN number may have been dialled by the telephone set for example.
- A two-second push holds the line in answer mode. The length of this push is signaled by two flashes of the DSR LED.
- If the button is pressed for more than 10 seconds (three flashes of the DSR LED), the modem resets.

IN ON-LINE MODE:

- When the modem issues a beep to report a dial backup connection, then pressing the button stops the alarm beep.
- Pressing the button once disconnects the modem and selects idle mode again.

4.1.4. Configuration Select

Holding MODE for more than 10 seconds will initiate a hardware reset.

If the switch is still pressed after some beeps are heard at power-up, the modem will enter configuration mode.

The front panel LEDs DTR, DSR, CD and LINE indicate which configuration the user can select. There are listed in the following table:

DTR	DSR	CD	LINE	Configuration
0	0	1	1	Factory configuration "0" async dial configuration (AT&F0)
0	1	0	1	Factory configuration "1" sync 2WLL configuration originate (AT&F1)
0	1	1	1	Factory configuration "2" sync 2WLL configuration answer (AT&F2)
1	0	0	1	Factory configuration "3" V25bis HDLC dialer (AT&F3)
1	0	1	1	Factory configuration "4" V25bis BSC dialer (AT&F4)
0	0	1	0	User configuration "0" (AT%M0)
0	1	0	0	User configuration "1" (AT%M1)
0	1	1	0	User configuration "2" (AT%M2)
1	0	0	0	User configuration "3" (AT%M3)
1	0	1	0	User configuration "4" (AT%M4)

Each of the configuration will stay on for 2 seconds while the MODE button is pressed. Releasing the button will select the new configuration, and this configuration will be loaded after power up. Immediately after the power up test (after the beeps), the LEDs will indicate which configuration is loaded for 2 seconds.

4.1.5. Factory configuration detail

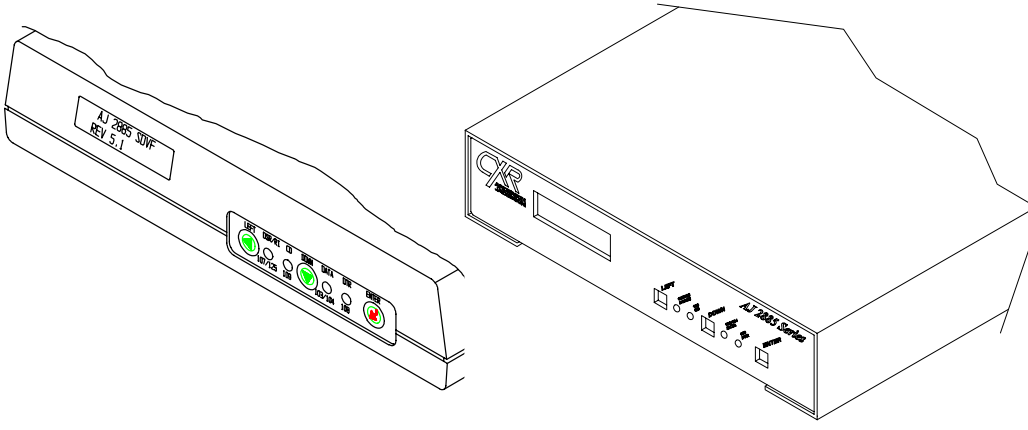
The following parameters differ from the factory 0 configuration.

- Factory 1 : E0 Q1 &D0 %D2 &C1 %C1 &R0 @A0 &M1 &L2 *LG0 *M1
- Factory 2 : E0 Q1 &D0 %D2 &C1 %C1 &R0 @A0 &M1 &L2 %O0 *LG0 *M1
- Factory 3 : E0 %D2 &C3 %C3 &R0 @V3 %B1 @A0 &M1 *LG0 *M1
- Factory 4 : E0 %D2 &C3 %C3 &R0 @V4 %B1 @A0 &M1 *LG0 *M1

These configurations may change without notice. Please check on your modem.

4.2. Configuration through front panel LCD and keypad

This chapter describes states of the front panel lights and operation of the LCD and keypad.



4.2.1. The four LEDs indicate the state of the modem

LED	Circuit	Function
DSR/Ri	107/125	Flashes when an incoming ring is receiving (125-Ri). On leased line, the Originate modem flashes 10 times per second and the Answer one 4 times per second, when waiting for carrier. When ON when DSR is activated, when the modem is off hook and when connected.
CD	109	Indicates that the modem is connected to the remote one, i.e. remote carrier is detected.
DATA	103/104	Flashes as data are received and transmitted by the modem.
DTR	108	Indicates that the data terminal equipment connected to the modem is ready for data communication flashes if DTR-108 is not active.

4.2.2. LCD displays

The LCD displays two lines of 16 characters:

- It displays results of the self test after power on.
- The main menu displays successively states of the modem (connection, speed, DTE interface status) and branches to configuration and dialing sub-menus.
- Theses menus are described on the menu map as a separate document.
- Three keys are used to pass between menus: down ↓ key accesses next item in a list, enter ↵ key validates a choice or branches to a sub-menu, and left ← key comes back one step to the main menu with no effect on last choice.

4.2.3. Three keys operation

↵ **ENTER** : This key validates the displayed choice or option, according to the following examples:

Case 1	PRESS ENTER FOR CONFIG CHANGE	Enter branches to the configuration sub-menus.
Case 2	CHANGE ? VISUAL DISPLAY	Enter branches to the AT display parameter sub-menus.
Case 3	COMMAND ECHO ON > OFF	Enter selects the new value of the parameter located on the right of the « > » symbol.

↓ **DOWN** : This key displays next item of the menu, i.e. next menu, or parameter or value, according to the following examples:

Case 1	SELECT CONFIGURATION?	↓	STORE CONFIGURATION ?	Displays next menu.
Case 2	COMMAND ECHO ON CHANGE?	↓	QUIET OFF CHANGE ?	Displays next parameter.
Case 3	COMMAND ECHO ON > OFF	↓	COMMAND ECHO ON > OFF	Displays next value of the parameter.

← **LEFT** : This key comes back one step to the previous menu, according to the following examples:

Case 1	CHANGE ? MODEM OPTION	←	AJ 2885 SDVF REV 5.01	Comes back to main menu.
Case 2	COMMAND ECHO ON CHANGE ?	←	CHANGE ? VISUAL DISPLAY	Comes back to configuration menu.
Case 3	COMMAND ECHO ON > OFF	←	COMMAND ECHO ON CHANGE ?	Leaves the parameter unchanged.

From the main menu, LEFT ← key is a multiple action key depending on the modem configuration and connection status:

- During training, left key aborts the connection and restores command mode,
- In on line mode, left key disconnects,
- In idle mode, if the modem is configured in leased line mode, left key initiates a leased line training,
- In idle mode when incoming rings are detected, left key initiates answer mode (acts as an 'ATA' command),
- In idle mode when the modem is configured in dial up mode (i.e. not in leased line mode), left key initiates a calling mode connection. The modem dials the first automatic number found in the phone book, or just hangs up in calling mode if any (acts as an 'ATDS' or 'ATD'),
- In leased line mode with dial backup option set, during training on lease line, left key initiates dial backup,
- During dial backup with alarm beep, left key stops beeping,
- During dial backup without alarm beep, left keep aborts the dial line connection and starts training on leased line.

4.2.4. Example

How to store a phone number in the phone book as would this AT command:

AT&Z3:CXR:FOX:33237:::A

- Number 3 in the phone book (range 0 to 99),
- « CXR » is the name field,
- « FOX » is the password field,
- LINK and CONFIGURATION fields are both left blank,
- « A », attributes means this number is dialed from the front panel or from the DTE interface (DTR, 108-1).

NOTA : Please refer to the AT command reference manual for more details on the phone book fields and usage (see AT commands: &N, &Z, DS).

While editing the number, the modem keeps modification in its memory:

- You may stop editing, and restart later,
- This memory is not saved: modification will be lost in case of reset by ATZ command or power lost,
- To save memory and make modification permanent, you must validate the last menu of the number editing: « PRESS ENTER TO SAVE NUMBER MEMORY ».

#	On display	Press the key	Comments
1	PRESS ENTER FOR CONFIG CHANGE	↵ to access configuration menus, then ↓ to display :	
2	CHANGE? PHONE NUMBERS	↵ to access phone number editing sub-menus	
3	CHANGE? P00:O 123456	↓ to access number 3	00 already exists in this example. Look at the name on line 1 an the number on the second line,
4	CHANGE? PO3 : 	↵ to start editing number 3	03 is empty in this example
5	P03:--NAME--? 	↵ to edit the NAME field	↓ would access to the PASSWORD next field
6	PO3:--NAME-- _	↓ three times to displays « C » character. Then leave ↓ pressed until you get a « C » again	Note that the ? symbol is gone. Note the cursor position while editing
7	PO3:--NAME-- C	↵ to validate this first character, the cursor moves on the right. Press ↓ to get the « X », then ↵, then ↓ to get the « R », then ↵	

#	On display	Press the key	Comments
8	PO3:--NAME-- CXR_	↵ no character is displayed on the cursor: ENTER key validates this field and initiate next field editing	↵ validate a field on a blank cursor
9	PO3:--PASSWORD--? 	Just like steps 5 to 8, press : ↵ once to start editing, ↓ to get « F », then ↵ (« F- ») ↓ to get « O », then ↵ (« FO- ») ↓ to get « X », then ↵ (« FOX- ») ↵ to validate « FOX », as the password and access to the next field of this number	
10	PO3:--NUMBER--? 	Again like previous steps, press: ↵ once to start editing, ↓ to get « 3 », then ↵ (« 3- ») ↓ to get « 3 », then ↵ (« 33- ») ↓ to get « 2 », then ↵ (« 332- ») ↓ to get « 3 », then ↵ (« 3323- ») ↓ to get « 7 », then ↵ (« 33237- ») ↵ to validate « 33237 »,	Note that dialable digits are available as well as control character. Refer to the dial command ATD in the reference manual
11	PO3:--LINK--? NONE	↓ to get next field	
12	PO3:--CONFIG--? NONE	↓ to get next field	
13	PO3:--ATTRIBUTE-- NONE	↵ to edit attribute field	
14	PO3: NONE AUTO CALL > ON ?	↵ to validate this choice	Note the attribute on the first line
15	PO3: A DIAL OUT > ON ?	↓ to display next attribute	
16	PO3 A PASSWD ACCS>ON ?	↓ 4 times to pass other attributes and display next menu	
17	SAVE MEMORY 	↵ to save these changes in permanent memory, or ← to ignore and return to configuration menu (step 2) without saving memory	

5. Configurations

This chapter describes commonly used configurations through the AT command set: These commands may be used as part of software drivers for example. The same configuration can be achieved through the LCD and keypad front panel. Refer to the LCD menu description in chapter 2.5.

5.1. Factory configuration

This configuration applies when the modem is first powered on, or after complete reset by the following commands:

AT&W255 <CR>

Answer : *OK*

ATZ <CR>

Answer : *OK*

This configuration is designed for most common applications and has the following characteristics:

DTE - V24:

- Normal CD, DTR,
- DSR and CTS forced on.

Automatic answer S0 = 2

Automatic hunt: V34, V32bis, V32, V22bis, V21 and V23 modes

Error correction and data compression: V42bis and MNP automatic mode (*M2)

Flow control: RTS/CTS (*LG2)

This configuration can be modified for a specific application. The following examples describe the most common applications.

5.2. Selecting the modem speed

Introduction :

Modem provides two interfaces : the DTE interface connected to the terminal, and the DCE one to the remote modem. This is described by the following picture of a point to point connection :

Modem adapts these two interfaces that may work at different rates : these are DTE and DCE speeds. The DTE speed applies on the terminal interface rate (between the modem and the terminal) while the DCE speed applies on the line rate (between both modems).

Controlling modem speed : in default factory configuration, modem is set for automatic mode also said Autobaud, which satisfies most cases of use. In this case, modem defines the DCE speed upon the DTE speed which was automatically detected whe the last AT command was received.

Modem speed can be controlled thanks to the following commands.

Asynchronous and Synchronous modes : modem can provide a synchronous or asynchronous interface to the terminal

Synchronous mode : DTE speed is the same as the DCE speed, i.e. the terminal speed might change upon connection from configuration speed.

Asynchronous mode : DTE speed does usually not depend on DCE speed, it is a constant rate interface. The terminal speed does not change from configuration speed upon connection. The opposite applies on two configuration cases :

(1) in direct mode : *M0 command

(2) in disabling the constant DTE modem : *C0 command

Autobaud : this features provides :

(1) an automatic detection of the terminal data format and speed when receiving AT commands,

(2) an automatic adaptation of the connection (DCE) speed to the speed lower or equal to the terminal one as to avoid its overflow.

V32Bis and V34 : these modes of connection support the same speedfrom 4.8 to 14.4 KBPS. The @OM command selects the desired mode which is especially suitable for leased line connection.

Modulation – DCE speed : the @M command selects the connection (DCE) speed when the Autobaud feature is off (parameter different from @A1)

Buffering and flow control : in asynchronous mode and especially when the DCE speed is lower than the DTE speed, modem can buffer data received from the terminal in order to adapt the data rate to a lower speed. The AJ2885 modem provides a buffer of about 1000 characters. Modem can run a flow control process when this buffer is about to get full in order to stop the sending terminal.. The same buffer and feature is available in the modem to terminal direction.

Buffers and flow control are available in normal mode (*M1) and with error correction and data compression (*M2 and **M3). On the other hand, modem is a transparent channel in direct mode (**M0) and in synchronous mode (&M1) : buffering and flow control are then not possible in both modes.

The flowing picture summarizes the action of these commands depending on their parameters. This assumes that the last AT commands were sent to the modem at a speed of 38400 BPS, and were : AT@An and then eventually AT@Mn :

CONFIGURATION PARAMETER (38,400 BPS)				CONNECTION RESULT	
Autobaud	Async / Sync	Mode	DCE sped	DCE speed	DTE speed
@A1 : ON	&M1 : Sync	Do not care	Do not care	33600	33600 (1)
@A2 : DTE @A0 : OFF	&M1 : Sync	Do not care	@M15: 28800	28800	28800 (1)
@A1 : ON	&M0 : Async	*M1 : normal *M2 : auto* *M3 : exclusive	Do not care	33600	38400 (2)
@A1 : ON	&M0 : Async	*M0 : direct	Do not care	33600	33600 (3)
@A2 : DTE @A0 : OFF	&M0 : Async	*M1 : normal *M2 : auto* *M3 : exclusive	@M4 : 9600	9600	38400 (4)
@A2 : DTE @A0 : OFF	&M0 : Async	*M0 : direct	@M4 : 9600	9600	9600 (5)

Remark :

(1) The synchronous mode parameter &M1 is dominating : DTE speed depends on the connection speed. It may also vary during connection in case of retrain or fall back negotiated with the remote modem for example.

(2) Except for direct mode (*M0), Autobauding (@A1) is dominating : DCE speed depends on the terminal DTE speed. The default factory configuration is based on this configuration.

(3) Direct mode parameter (*M0) is dominating : DTE speed change to the DCE speed upon connection. Any speed change should be avoided in asynchronous mode since the DTE terminal could not adapt to any further speed change.

(4) Autobauding is either limited to the DTE speed detection (@A2) or disabled (@A0) : DCE connection speed can be set up independently thanks to the @M parameter. DTE terminal speed remains unchanged in asynchronous mode (constant DTE speed).

(5) Again Autobauding is either limited to the DTE speed detection (@A2) or disabled (@A0) : the @M parameter sets the DCE connection speed independently from the DTE speed. But, DTE terminal speed becomes the DCE speed upon connection because of direct mode (*M0). Again, any speed change should be avoided in asynchronous mode since the DTE terminal could not adapt to any further speed change.

5.3. Rate and connection mode selection

The AJ 2885 provides several solutions to determine the mode of connection.

- Selecting connection mode for speeds of 2400 to 19200 BPS : the modem can connect these speeds in V34 mode or in older V22, V22Bis, V32Bis or V32 is modes. The AT @OM command selects the wanted mode of connection This command should be left as @OM3 for automatic mode adaptation since the V34 mode is designed to recognise V32 / V32Bis remote modems during the handshake.
- Autobaud : the modem recognises automatically the speed and the data format of the terminal when it sends an AT command. If the 'full' autobaud is active - AT @A1 - then the modem will adapt the connection rate to the nearest lower connection speed. This is the

default factory configuration. The autobaud must be changed to select a special speed. It can be limited to the DTE autobaud - AT @A2 - which means that the modem still recognises the terminal data format and speed but does not change the connection rate. Or it can be disabled - AT @A0 - which means that both the DTE data format and speed, and connection mode are selected by Commands.

The following picture lists all connection modes on the first row, and the configuration in full autobaud and limited or disabled autobaud.

Rate - modulation	Modem autobaud : AT@A1 DTE speed / AT command	DTE autobaud : AT@A0 or AT@A2 AT command
300 - V21	300 / -	@M0
1200T,75T - V23	Modem can not be autobaud	@M10
75R,1200T - V23	Modem can not be autobaud	@M11
1200 - V22	1200 / AT @OM2	@OM2 @M1
2400 - V22 Bis	2400 / AT @OM2	@OM2 @M2
4800 - V32	4800 / AT @OM2	@OM2 @M3
9600 V32	9600 / AT @OM2	@OM2 @M4
7200 - V32 Bis	V32Bis fall down speed	@OM2 @M9
12000 - V32 Bis	V32Bis fall down speed	@OM2 @M5
14400 - V32 Bis	V32Bis fall down speed	@OM2 @M6
2400 - V34	2400 / @OM3	@OM3 @M2
4800 - V34	4800 / @OM3	@OM3 @M3
7200 - V34	V34 fall down speed	@OM3 @M9
9600 - V34	9600 / @OM3	@OM3 @M4
12000 - V34	V34 fall down speed	@OM3 @M5
14400 - V34	V34 fall down speed	@OM3 @M6
16800 - V34	V34 fall down speed	@OM3 @M7
19200 - V34	19200 / @OM3	@OM3 @M8
21600 - V34	V34 fall down speed	@OM3 @M12
24000 - V34	V34 fall down speed	@OM3 @M13
26400 - V34	V34 fall down speed	@OM3 @M14
28800 - V34	V34 fall down speed	@OM3 @M15
31200 - V34	V34 fall down speed	@OM3 @M16
33600 - V34	>= 38400 / @OM3	@OM3 @M17

Notes :

- V34 mode on lease line should be better used without the V8 preamble. This can be achieved by the command AT @OM1 instead of AT @OM3.

- The status page 3 details all information on DTE and modem speeds, data format, parity, synchronous or asynchronous mode (answer to the AT&S3 command).

5.4. Asynchronous or synchronous mode :

The AJ 2885 distinguishes the command and the connection modes :

- The command mode is defined by the AT @V command : asynchronous AT (@V1), asynchronous V25 Bis (@V2), V25Bis HDLC (@V3), V25 Bis BSC (@V4) or disabled (@V0).
- The connection mode is defined by the AT &M command : asynchronous (&M0) or synchronous (&M1).

5.5. Configuration of the asynchronous mode :

The following features apply on asynchronous connection mode.

5.5.1. Error correction and data compression:

The modem is set in default factory configuration in automatic mode so that it can negotiate the best protocol with the remote modem.

A flow control should be configured in asynchronous mode to avoid loss of received data.

The following commands apply :

Command	Function
*M0	direct mode, no protocol. The modem is transparent to the transferred data. No flow control is possible. The XON.XOFF flow control is passed over the line.
*M1	Normal, no protocol. The modem buffers transferred data. Flow control can be RTS-CTS or XON XOFF.
*M2	Automatic. The modem tries to negotiate V42 or MNP modes
*M3	Exclusive. The modem only accepts connection in the configured protocol.
*T	Protocol type : MNP (*T1), V42 (*T2), automatic (*T3).
*G	Error alarm : the internal high speaker may beep when it detects an errored packet in the received data flow (*G0 : disable, *G1 : enable).
&M0	Selects the asynchronous connection mode.

5.5.2. Flow control:

Through Xon-Xoff : :

AT *LG1 generates a local Xon-Xoff,

AT *LR1 answers to the local Xon-Xoff

These commands are the original AJ commands. For compatibility with standard general purpose modems the following command may be used : AT &K4

Through RTS-CTS :

AT *LG2 generates a CTS flow control

AT * LR2 answers to the RTS flow control

AT %C1 sets the CTS signal for flow control

AT&R1 sets the RTS signal for flow control

The *LG and %LR commands are the original AJ commands. For compatibility with standard general purpose modems the following command may be used : AT &K3

5.6. Configuration of the synchronous mode

AJ2885 modem provides synchronous connection in transparent mode, i.e. the same speed applies on both DCE and DTE interfaces.

The following parameters should be adjusted for synchronous connections:

Command	Function
&M1	Selects the asynchronous connection mode.
*M	0. Direct mode. The modem is transparent to the transferred data. Transfer delay is the lowest possible. 1. Normal mode. The modem buffers bytes and re-synchronises bit to the receive and transmit clock whenever possible.
&X	0. Internal clocks. The modem generates the clocks on V28 interface pin 15 (pin 13 and 15 in V11 interface) 1. External clock. The modem uses the terminal clock provided on V28 interface pin 24 (pin 11 and 24 in V11 interface). This clock must be well adjusted to the connection mode rate. 2. Slave clock. The modem synchronises from the received carrier and provides these clocks on V28 interface pin 17 (pin 12 and 17 in V11 interface).

Note : some synchronous terminals sends permanent data even when the modem are not connected. To prevent the modem to interpret these data as configuration command, it can be set in dumb mode by the AT @V0 command, or by the X1 jumper.

(1) The &Xn parameter defines the transmit clock behaviour. A typical modem connection sets one modem for internal clock and the other one in slave mode.

(2) Whenever the DTE terminal issues the clock should the modem be set for external clock (&X1). Frequency accuracy of the DTE clock must be compatible with the modulation.

(3) In case the terminal may issue a permanent data flow even out of connection could the DUMB mode be set to avoid any spurious commands or escape to command mode sequences. Either set the DUMB jumper on the modem board or use the @V0 command. When DUMB mode is set by the @V0 command then coming back to command mode must be achieved by restoring the factory default configuration in pressing the front panel button during power-up : the use of the DUMB mode jumper (J6) may be an easy alternatve. The escape to command mode sequences may be disabled by resetting the S12, S26 and S43 registers.

5.7. Automatic dialing directory

The AJ 2885 has a non volatile memory that allows the user to store frequently used numbers. Each phone number can have a name and control sequence associated. So instead of remembering every number, the user can type in the recipient name, thus greatly easing the task of making a connection.

The following example shows how to store a number, name and control sequence at location 3 of the directory memory.

Dialing a direct line, send the command:

ATDT36062424 <CR>

Dialing via a PABX, send the command:

ATDP0W36062424 <CR>

Storing a number in the directory (number 3), send the command:

AT&Z3:NAME:CONTROL:P0W36062424:::A <CR>

Show directory contents, send the command:

AT&N <CR>

Dialing from the directory:

- The ATDSn command dials the stored telephone number specified by n where n is 0 to 99.
- By CCITT 108/1 operation. The modem autodials a stored number when an off-to-on transition of the DTR occurs. The modem disconnects when an on to off transition of the DTR occurs. AT&D1 command select the dialing mode of the DTR signal.
- By the phone number name by the ATD$name command.

5.8. Leased line

A leased line is a permanent analogue telephone connection between 2 sites. Therefore connection is started with a direct training, i.e. without dialling.

Depending on the selected configuration, the following commands are sent to the modem.

(See reference manual for a description of these commands).

Configuration	Originating modem	Answering modem
2-wire line	AT&L1%O1&W <CR>	AT&L1%O0&W <CR>
4-wire line	AT&L2%O1&W <CR>	AT&L2%O0&W <CR>
Dial back up	AT%U1	AT%U1
1234 back up dial number	AT&Z:::1234:::A <CR>	S0=1
Recovery lookback	AT%L1&W <CR>	AT%L1&W <CR>

After this leased line configuration is saved by the AT&W command, the modem will start training on leased line if :

- it is reset by ATZ or by a power restart,
- the front panel button is pressed.

For V34 mode of connection, better disable the V8 preamble by the command : @OM1

Automatic Dial Backup : the master or Originate modem is in charge of initiating the dialup connection if case of leased line failure. Modems issue alarm beeps, set the backup 117 signal and flash the DSR front panel led once the dialup connection is on. AJ2885P modems has an embedded real time clock and calendar to disable dial backup connection outside working week-day and week-end periods as to optimise the cost if the dialup connections.

Leased line look back : modems check for leased line recovery when in dial backup from the S56 timer (in minutes). Look back is continuous and safe through a specific handshake as to avoid ineffective retrains on leased line.

Permanent link on dialup line : a leased line like connection can be performed over dialup line by setting S61 register to 1 (ATS61 = 1). This special mode does not comply with dialup requirements : it is the user's responsibility to use this mode on a private line only.

5.9. V23 and Bell 202 T Modes on Leased Line

AJ2885P modem provides several V23 – BELL202 modes on leased line as summarized by the following picture :

Type of connection	AT Command	Model
Classical 1200 / 75 V23 mode : on a 2 or 4 wire line, full duplex link at 1200 BPS one way (@M11 modem to @M10 modem) and 75 BPS the other way.	1200 BPS sender modem: @A2@M11&R1 1200 BPS receiver modem: @A2@M10&R1	All
Reversing 1200/75 V23 mode : the same mode can be reversed through RTS signal control. @M10 or @M11 command may be used since the transmission mode depends on the RTS signal.	@A2 @M10 (or @M11) &R2	All
1200 / 1200 half duplex : this mode does not provide the 75 BPS return channel, and applies on 2 or 4 wire lines. Reversal is under RTS signal control.	@A2 @M10 &R3 S26=10	All
1200 / 1200 full duplex : a full duplex FSK link on a 4 wire line only.	@A2 @M10 &R1 @OT1	BP ant BD
1200 / 1200 half duplex or carrier controlled mode or Master – Slave mode : the same mode may be used for multi-point or master- slave link. Master modem is set for permanent transmission while slave modem transmission is under RTS control. The reversal delay is as fast as 30 ms which is adjusted by the S26 register (in ms)	Maître : @A2 @M10 &R1 @OT1 Esclave : @A2 @M10 &R3 @OT1 S26=30	BP and BD

DTE interface signal in half duplex configuration :

- transmission is controlled by RTS : &R2 or &R3 parameter
- Transmission acknowledgement is provided by CTS : %C1 parameter
- Carrier detection (remote modem signal) is provided by CD : &C1 parameter

Half duplex reversal delay : this delay is set by the S26 register

- expressed in Nx10 ms for connection without 75 BPS return channel (case 2 and 3 of the previous picture) with a minimal value of 8 i.e. 80 ms
- expressed in Nx1 ms for 1200/1200 full duplex connection (case 5 of the previous picture) with a minimal value of 30, i.e. 30 ms. This mode applies on AJ2885P-Bxx models only.

The sending modem starts the S26 timer when the RTS signal rises, and sets the CTS signal when the S26 timer is complete. This delay corresponds to the remote modem synchronization time.

Bell 202 T : Bell 202 specific frequencies are used thanks to the B1 command.

5.10. Saving user configurations

The **AJ 2885** modem can store up to 5 user configurations.

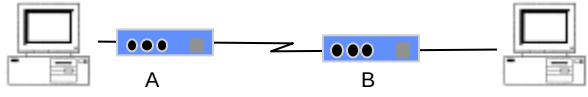
The AT&Wn command saves the current configuration in non-volatile memory (n = 0 to 4). This configuration is saved even when the modem is turned off. The modem will load the last saved user configuration at power-up.

5.11. V54 - Maintenance

The AJ 2885 modem provides V54 loop test functions.

The A terminal can monitor the following tests :

- Analogue local loop or B3: the A modem connects on its own carrier. The A terminal can check characters it sends are well returned. The good operation of the A modem is tested.
- Remote digital loop or B2 : the B modem sends back all characters received from the line. The A terminal can test the entire link to the remote modem.

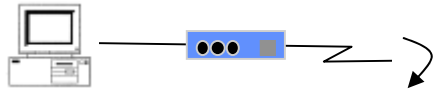


5.11.1. AT command operation

The status page 10 lists all V54 test features (command AT&S10)

- ***B 3 : local analogue loop*** : the A modem is in local command mode. The local loop may be started by the following commands :
- AT&T1 : simple loop. The modem connects and sends a CONNECT xxxx message. All characters sent by the A terminal are sent back after modulation.
- AT&T8 : in the same kind of local loop the A modem sends and checks automatically test characters. The error counter is displayed at the end of test.
- End of test : the test ends at the test timeout defined by S18, or by entering an escape sequence ('+++')and an AT&T0 command
- Front panel LED: the CD led is on when the modem is connected, DSR led stays off.
- Example :

A A

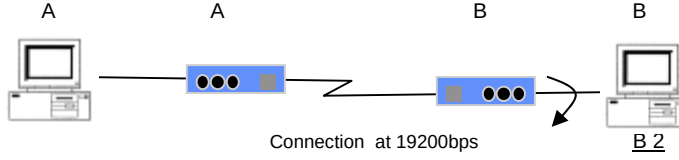


Boucle 3

AT&T1 <RC>..... start the test
CONNECT 19200 ..... Connect message
ABCDE..... characters sent by the terminal
+++..... escape to command mode
OK
AT&T0..... End of test command

- Note: the connection status (AT&s8) page can be displayed during the test after an escape to command mode.

- ***B 2 : remote digital loop*** : modems are connected before starting the test.. the remote loop on the B modem is initiated from the A modem by the following commands :
- AT&T6 : simple loop. The A terminal checks returned characters. The connection must be done without any error correction protocol (AT*M1)
- AT&T7 : same loop with automatic character sending and checking by the A modem. It displays the error counter at the end of test. The connection must be done without any error correction protocol (AT*M1)
- End of test : the test ends at the test timeout defined by the S18 register, or by entering an escape sequence ('+++') and an AT&T0 command.
- Front panel LED: on the B modem, the DSR led flashes and the CTS signal is dropped during the test.
- Example :



+++
OK ..... escape to local command mode on modem A

AT&T6
OK ..... requests a remote digital loop to B modem
ABCDE ..... characters issued by the A terminal are sent back by the B modem

+++
OK
AT&T0 ..... End of test
OK
ATO ..... Return to connected mode and reactivate the data link between the A and B terminals.

6. Security and memory

6.1. Principles

The modem contains three types of memory:

The FLASH-E**PROM**, where factory configuration is stored permanently,

The **RAM**, where the modem configurations are stored temporary,

The **NVRAM** where semi-permanent data is stored even when the modem is turned off.

The first time your modem is turned on, or after a complete reset, these three memories are identical and set to the default factory configuration.

The **AT&Wn** command saves the current configuration in the non-volatile memory, (n = 0 to 4) or activates a factory configuration for the next reset (n=5 to 9).

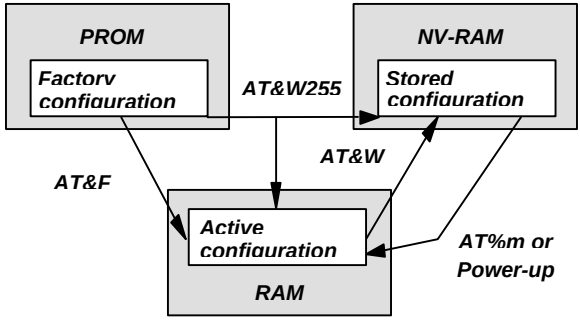
For example :

AT &W0 save and activate the current user's parameters in bank 0

AT &W5 activates factory configuration bank 0 for next reset, with no change on the other user's configuration banks.

The last stored user configuration will be loaded automatically on next power-up.

These memory operations are shown on the following diagram:



Memory reset	**AT&W255**
Memory store	**AT&W0 to AT&W4**
Loading of a factory configuration without loosing the stored memory	**AT&F0 to AT&F4**
Loading the user configuration	**AT%M0 to AT%M4**

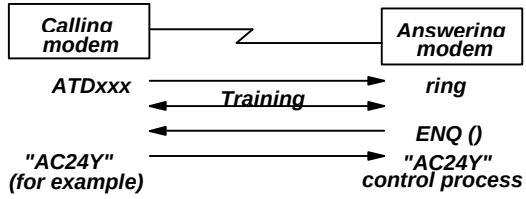
6.2. The phone directory

Up to 100 phone numbers can be stored in the modem's non-volatile memory, to be used by the automatic dialler.

Save a number	**AT&Z0:Directory::11:::A**
This command saves automatically the directory in non-volatile memory	
Dial a number	**ATDS0 <CR>**
Display the directory	**AT&N <CR>**

6.3. Answerback security

This security mode is controlled by the answering modem, and depends on a password exchange which authorizes a modem connection, i.e.:



If the answerback matches the one stored in memory within two seconds after an ENQ code was sent by the answering modem, access is granted.

Otherwise the modem disconnects automatically.

To store the answerback code, see the following example. The password can be up to 12 characters long.

Store answerback (for example: AC24Y)	**AT&A:AC24Y:AC24Y <CR>**
To disable answerback security	**AT&A:: <CR>**

6.4. Callback security

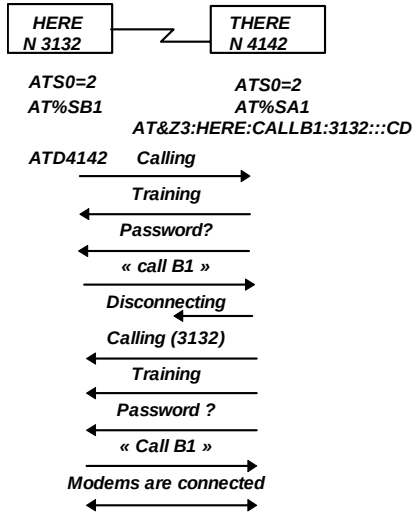
6.4.1. Automatic callback

This security mode is controlled by the answering modem.

It sends a password and then calls back the telephone number associated with that password.

See %SA and %SB commands in the reference manual.

Example:

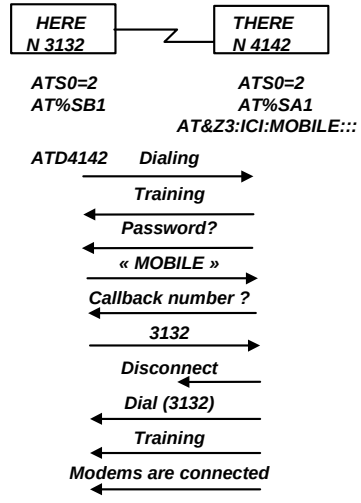


This double security guarantees password and localization of the calling modem.

6.4.2. Dial number request callback.

The remote user may provide the callback number after password control.

Example:



6.5. Inactivity password

The modem asks for a password when no data passes through it for a presented delay. If this password matches the operator or supervisor password stored in memory then the modem will reconnect otherwise it will drop the line.

S32: number of minutes of inactivity that will start the password request.

S96: number of seconds that the modem will wait for the password.

AT%ST 0/1: number of password trials (0: one trial / 1: three trials).

AT%In: inactivity is detected if:

- n=0: no detection, i.e. feature is disabled.
- n=1: detects transmitted data inactivity.
- n=2: detects received data inactivity.
- n=3: detects both received and transmitted data inactivities.

AT%PS: SUPER:SUPER: stores the supervisor password, (SUPER as an example).

AT%PO: OPE:OPE: stores the operator password (OPE as an example).

7. Specifications

7.1. Line side characteristics

Mode	Switched network	2-wire leased line	4-wire leased line
Receiver sensitivity	- 43 dBm	- 33 dBm	- 26 dBm
Carrier detection: Open threshold Close threshold	 < - 48 dBm > - 43 dBm	 < - 38 dBm > - 33 dBm	 < - 31 dBm > -26 dBm
Transmission level: Nominal Maximum Minimum	 - 10 dBm - 8 dBm - 16 dBm	 - 14 dBm 0 dBm - 16 dBm	 - 14 dBm 0 dBm - 16 dBm

AJ2885P (except FTV model) provides transmit levels higher than –10 dBm : it is under user's responsibility to avoid these levels on the public network, and use them on private lines only for special applications. Maximum received level is –10 dBm only : some higher received level may induce a loss of performance.

Recom-mendations	Call/Answer	Speed Bps	Xmit 0	Xmit 1	Received 0	Received 1
V22 bis	Call	2400	1200	1200	2400	2400
	Answer	2400	2400	2400	1200	1200
V22	Call	1200	1200	1200	2400	2400
	Answer	1200	2400	2400	1200	1200
V21	Call	300	1180	980	1850	1650
	Answer	300	1850	1650	1180	980
V23	Call	75	450	390	2100	1300
	Answer	1200	2100	1300	450	390
V32		9600	1800 Hz			
V32 bis		14400	1800 Hz			
V34		33600	Adaptive			

7.2. Automatic call & answer

7.2.1. Originating

Automatic dialling or calling by the originating modem is initiated by:

- "AT" or V25bis commands
- Push button on front panel
- DTR 108/1 being enabled
- Pulse or tone dialing.

Tone recognition occurs when there is:

- A dial request (public network or private exchange).
- A busy line.
- The call monitoring by the internal high speaker can be disabled.

7.2.2. Answering a Call

When the modem is set in answer mode, it will go off hook after 2 rings (if the command ATS0=2 is sent). This is in conformity with CCITT V25bis recommendation.

7.2.3. Connection - Disconnection

In calling mode, the modem will automatically recognize the remote modem modulation type and adapt correspondingly.

It will disconnect only if:

- The carrier is lost,
- No carrier tone is detected within 35 to 90 seconds,
- No data activity has occurred for the selected period of time dictated by the Inactivity Timer.

7.3. Serial interface

The V24 serial interface of the modem conforms to the DCE specifications. A straight ribbon cable is all that is needed to connect to the DTE port of your computer or terminal. The serial port will automatically recognize DTE speeds up to 115200 bps. This is called auto-bauding.

Both asynchronous and synchronous (except FSK : V21, V23) modes with internal or external clock are supported.

7.4. Fax-mode

7.4.1. Automatic Call and Answer

See 5-2

7.4.2. Transmission Modes

The modem provides the ability to send and receive faxes at speeds up to 9600 bps.

The following modulations are supported:

ITU-T	Speed Bps	Carrier (Hz)
V21	300	1650 – 1850
V27 ter	2400 / 4800	1800
V29	7200 / 9600	1700
V17	12000 / 14400	1700

7.4.3. Operating Mode

In fax mode, the modem support the following standards:

- Group III Fax, EIA 578 class 1 and class 2 compatible,
- CCITT T4 - T30 recommendations.

7.4.4. Service Class 1 Command Set

The following AT commands control the operation of a class 1 modem/fax:

+FCLASS	Service class identification and control
+FTS	Stop transmission and wait
+FRS	Receive silence
+FTM	Transmit mode
+FRM	Receive mode
+FTH	Transmit T30 command mode

+FRH Receive T30 command mode
+FCERROR Error code

7.4.5. Service Class 2 Command Set

The following AT commands control the operation of a class 2 modem/fax:

+FCLASS Service class identification and control
+FMDL Fax-modem model
+FMFR Fax-modem manufacturer
+FREV Fax-modem checkup
+FBUG Frame report
+FAA Automatic answer
+FBOR Data bit order
+FDCC Fax-modem capability selection
+FDIS Capability initialization for transmission
+FLID Identification selection of the fax-modem
+FCON Remote fax detection
+FCIG Identification of called subscriber by CIG
+FCSI Identification of called subscriber by CSI
+FTSI Identification of calling subscriber by TSI
+FDTC Called fax return capability - DCS frame
+FDCS Discussed capability for process - DCS frame
+FHR Content of received frame
+FHT Content of transmitted frame
+FBUF? Buffer state
+FDT Fax message transmission
+FPTS Page transmission result
+FDR Fax message reception
+FCFR Reception mode confirmation
+FPTS Remote reception status
+FET End of page status
+FHNG End of procedure status
+FAXERR Error code

7.5. General characteristics

Dimensions : Length: 260 mm,
Width: 170 mm,
Height: 35 mm.

Weight: 0,7kg.
External power supply module: 230V/50Hz.
Power consumption: 25mA.
Operating temperature: 0 to 50°C.
Relative humidity: 0 -> 90% non-condensing.

8. Troubleshooting

Problem:

This chapter lists most modem operating problems.

Problem	Check
No tone when modem is turned on	Connection to the mains On/Off switch in On position Power supply of the rack and fuse of the card (rack version), DTR indicator on or flashing
Single and continuous tone when modem is turned on	Send commands: **AT&W255 <CR>** **ATZ <CR>** Then restart the modem to see if the same continuous tone is heard. See Ati7 section below.
Modem does not answer commands	Flashing of the TXD indicator when sending characters. No flash: check V24 cable. Flashes: <CR> command: **AT&S4 <CR>** and check for a long flash of TXD indicator. Long flash: check V24 cable.
Modem answers "NO DIAL TONE"	Try to dial an outside line using the ADT command. Make sure that you select a valid telephone number and dialling mode (P-Pulse, T-Tone). Listen to the internal speaker to hear the normal dial tone is heard. If not check the line connection.
Modem refuses to dial	Check for any blacklisting: **AT&NB <CR>** (see reference manual) Turning the modem off and on resets the blacklist.

ATI7 command:

Check the answer to the ATI7 command. It provides a clear message in case of self detected problem.

ATI7 Response	
BAD ROM	Code EPROM checksum bad
BAD RAM	Write and read failure in RAM
BAD NON VOLATILE MEMORY	Non volatile memory checksum bad
BAD DSP	DSP bad
ALB FAILED	Analog loopback test bad

If a problem persists after these verifications, contact your near distributor or the CXR "Hot Line" service:

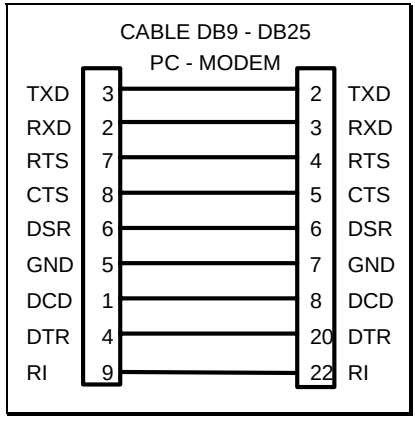
HOTLINE: +33 (0) 237.628.804.

9. Appendix A - V24 signals

9.1. V24 – V28 interface

Pin number	Name	CCITT number	
1		101	Earth protection
2	TXD	103	Data transmission
3	RXD	104	Data reception
4	RTS	105	Request to send
5	CTS	106	Clear to send
6	DSR	107	Data set ready
7	GND	102	Signaling earth
8	CD	109	Carrier detect
10 (*)	Si	117	Dial backup indicator
12	SPD	-	High speed indicator
15	SCT	114	Time basis for signal elements at transmission. Source: ETCD
17	SCR	115	Time basis for signal elements at reception
18	TB3	141	Test command. Local loop 3.
20	DTR	108/2	Data terminal ready
21	DB2	140	Test command: remote control of loop 2
22	RI	125	Ring indicator
24	SX	113	Time basis for signal elements transmission. Source: ETTD.
25	TEST	142	Test indicator.

(*) except FT model

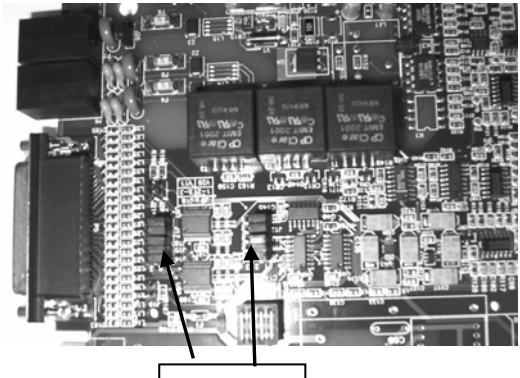


9.2. V11-V35 interface:

The AJ 2885P (except FT model) modem provides a terminal interface configurable in V28 or V11 through the J12 to J21 jumpers.
The jumpers in position 1-2 set a V28 signal. In position 2-3 they set a V11 signal.
To allow any V11 signal (mixed V28 and V11 signals), the J9 jumper must be set in position 2-3.
The following picture describes the confirmation of the interface.

Pin	V28 signal	V11 signal	Jumper
1	101 – P.GND	101 – P.GND	
2	103 – TXD	103 A – TXD A (*)	J 11
3	104 – RXD	104 A – RXD A	J 14
4	105 – RTS	105 – RTS	
5	106 – CTS	106 – CTS	
6	107 – DSR	107 – DSR	
7	102 – S.GND	102 – S.GND	
8	109 – CD	109 A – CD A (I A)	J 15
9	116 - SS	116 – SS	
10	117 – SI	117 – SI	
11	111 – S.V24	113 B – SCTE B (*)	J 13
12	112 – I.V24	115 B – SCR B	J 18
13	-------	114 B – SCT B	
14	------	103 B – TXD B (*)	
15	114 – SCT	114 A – SCT A	J 16
16	------	104 B – RXD B	
17	115 – SCR	115 A – SCR A	J 17
18	141 – TB3	141 – TB3	
19	------	109 B – CD B (I B)	
20	108 – DTR	108 A – DTR A (C A) (*)	J 10
21	140 – TB2	140 – TB2	
22	125 – RI	125 – RI	
23	------	108 B – DTR B (C B) (*)	
24	113 – SCTE	113 A – SCTE A (*)	J 12
25	142 – TEST	142 – TEST	

(*) For V11 mode, jumpers J19, J20 and J21 connect a 560 Ohm resistor on the received signals : TXD, SCTE and DTR-C respectively.



J9-J21

9.3. X21 – V11 Adaptation Cable

An X21 adaptation cable can be designed according to the following cabling matrix :

DB25M Pin	V11-X21 Signal	DB15F Pin
1	Mechanical GND	1
2	TA (Transmit)	2
3	RA (Receive)	4
4		
5		
6		
7	GND	8
8	IA (Indication)	5
9		
10		
11	XB (DTE Clock)	14
12	SB (Clock)	13
13		
14	TB (Transmit)	9
15		
16	RB (Receive)	11
17	SA (Clock)	6
18		
19	IB (Indication)	12
20	CA (Control)	3
21		
22		
23	CB (Control)	10
24	XA (DTE Clock)	7
25		

A DB25M – DB15F adaptation cable may be provided as an option with the CXR reference : CA 100 766

9.4. V35 Adaptation Cable

An X21 adaptation cable can be designed according to the following cabling matrix :

Broche DB25M	Signal V35	Broche V35/M34F
1	101 – P.GND	A
2	103 A – TXD A	P
3	104 A – RXD A	R
4	105 – RTS	C
5	106 – CTS	D
6	107 – DSR	E
7	102 – S.GND	B
8	109 – CD	F
9		
10		
11	113 B - XCK-B	W
12	115 B - RCK B	X
13	114 B – TCK B	AA
14	103 B – TXD B	S
15	114 A – TCK A	Y
16	104 B – RXD B	T
17	115 A – RCK A	V
18	141 – TB3	K
19		
20	108 – DTR	H
21	140 – TB2	N
22	125 – RI	J
23		
24	113 A – XCK A	U
25	142 - TEST	NN

A D25M –M34 adaptation cable may be provided as an option with the following CXR reference :

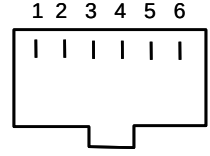
- V35 socket with 1.6 mm pins : CA 602 300
- V35 socket with 1.1 mm pins (France) : CA 602 299

9.5. Dial line connector: RJ11 connector

Pin	Signal
1	Not used
2	Telset Tip
3	Tip PSTN
4	Ring PSTN
5	Telset Ring
6	Not used

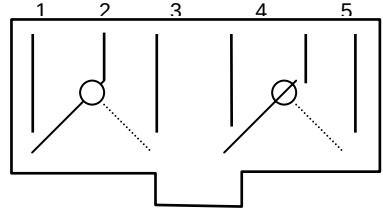
9.6. Leased line connector : RJ11 connector

Pin	Signal 2W	Signal 4W
1	Not used	Not used
2	Not used	Receive Tip
3	Tip	XMIT Tip
4	Ring	XMIT Tip
5	Not used	Receive ring
6	Not used	Not used



9.7. Alarm relay connector

Pin	Signal
1	Idle contact – Relay 1
2	Common contact - Relay 1
3	Active contact – Relay 1
4	Idle contact – Relay 2
5	Common contact – Relay 2
6	Active contact – Relay 2



10. Appendix B - Country specific information

UK	Although this equipment can use either loop disconnect or DTMF signalling, only the performance of the DTMF signalling is subject to regulatory requirements for correct operation. It is therefore strongly recommended that the equipment is set to use DTMF signalling for access to public or private emergency services. DTMF signalling also provides faster call set up.

11. Appendix C – General conditions of guaranty

Material and software are guaranteed by CXR manufactures, for one year after the date of delivery, under the following conditions:

1. The material and software guaranty :

Guaranty will only apply if the guaranty coupon is returned to CXR within a delay of one month after the delivery

2. Material :

Any intervention on the material by a person or a maintenance centre which would not have been accepted by CXR during the period of guaranty will abort the application of the guaranty. Any damage due to an accident, a bad use or a non compliant installation, is not covered by the guaranty.

3. Documentation :

The documentation does not guaranty the use of the product. CXR is not held of any responsibility concerning the maintenance, the debugging or the replacement of product documentation.

4. Technical support :

CXR grants to the customer a free hot line support aid at working hours for a limited time of one month after the date of delivery.

5. New versions of products :

CXR may develop improved or modified versions of the software. The cost of the possible update acquirement will be governed by a tariff provided by CXR.